

Photoelectron-vibrational coupling: Resonant and nonresonant molecular photoionization processes

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We study valence shell vibrationally resolved gas phase photoelectron spectroscopy studies of complex polyatomic molecules. Specifically, we use tunable VUV radiation at beamline 10.0.1 at the Advanced Light Source to investigate the coupling between photoelectron and molecular vibrational degrees of freedom. In this talk, I will mainly focus on a variety of mode-specific photoelectron trapping observed in resonant photoionization of a few complex polyatomic systems. Very recent preliminary results on non-resonant photoionization dynamics will also be presented briefly. We perform single channel Schwinger variational scattering calculations to interpret our experimental observations. We have demonstrated that the nontotally symmetric vibrations observed in the photoelectron spectra in many, if not most cases, are due to photoelectron-mediated intrachannel vibronic coupling, rather than interchannel Herzberg-Teller coupling.